

PATENT

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

Jon Opsal et al.

Application No.: NEW

Filed: HEREWITH

For: SYSTEMS AND METHODS FOR
EVALUATING SEMICONDUCTOR
LAYERS

Group Art Unit: Unknown

Examiner: Unknown

**INFORMATION DISCLOSURE
STATEMENT**121 Spear Street, Suite 290
San Francisco, CA 94105
(415) 512-1312

M/S PATENT APPLICATION

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

Sir:

Applicant(s) submit(s) herewith patents, publications or other information [attached hereto and listed on the attached Form PTO-1449 (modified)] of which they are aware, which they believe(s) may be material to the examination of this application and in respect of which there may be a duty to disclose in accordance with 37 CFR § 1.56.

This Information Disclosure Statement:

- (a) ☒ accompanies the new patent application submitted herewith. 37 CFR § 1.97(a).
- (b) ☐ is filed within three months after the filing date of the application or within three months after the date of entry of the national stage of a PCT application as set forth in 37 CFR § 1.491.
- (c) ☐ as far as is known to the undersigned, is filed before the mailing date of a first Office Action on the merits, or before a first office action after filing a Request for Continued Examination under §1.114.
- (d) ☐ is filed after the first office action and more than three months after the application's filing date or PCT national stage date of entry filing but, as far as is known to the undersigned, prior to the mailing date of either a final rejection or a

Atty Docket No.: TWI-6660

notice of allowance, whichever occurs first, and is accompanied by either the fee (\$180) set forth in 37 CFR § 1.17(p) or a certification as specified in 37 CFR § 1.97(e), as checked below.

- (e) ☐ is filed after the mailing date of either a final rejection or a notice of allowance, whichever occurred first, and the Issue Fee has not been paid, and is accompanied by the fee (\$130) set forth in 37 CFR § 1.17(i)(1) and a certification as specified in 37 CFR § 1.97(e), as checked below. This document is to be considered as a petition requesting consideration of the information disclosure statement.

[If either of boxes (d) or (e) is checked above, the following "certification" under 37 CFR § 1.97(e) may need to be completed.] The undersigned certifies that:

- (f) ☐ Each item of information contained in the information disclosure statement was cited in a communication mailed from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement.
- (g) ☐ No item of information contained in this information disclosure statement was cited in a communication mailed from a foreign patent office in a counterpart foreign application or, to the knowledge of the undersigned after making reasonable inquiry, was known to any individual designated in 37 CFR § 1.56(c) more than three months prior to the filing of this information disclosure statement.

A list of the patent(s) or publication(s) is set forth on the attached Form PTO-1449 (Modified).

A copy of the items on PTO-1449 (Modified) is supplied herewith, except as noted below.

Those patent(s) or publication(s) which are marked with an asterisk (*) in the attached form PTO-1449 (Modified) are not supplied because they are (a) either U.S. Patents and this an application filed after June 30, 2003, or (b) were previously cited by or submitted to the Office in a prior application no. 10/342,027, filed January 14, 2003, application no. 10/098,641, filed March 15, 2002, application no. 09/957,478, filed September 20, 2001, application no. 09/688,562, filed October 16, 2000, application no. 09/431,654, filed November 1, 1999, and application no. 08/887,865, filed July 3, 1997, and relied upon in this application for an earlier filing date under 35 U.S.C. § 120.

A concise explanation of relevance of the items listed on form PTO-1449 (Modified) is:

- (k) ☒ not given
- (l) ☐ given for each listed item
- (m) ☐ given for only non-English language listed item(s) [Required]
- (n) ☐ is in the form of an English language copy of a Search Report from a foreign patent office, issued in a counterpart application, which refers to the relevant portions of the references [copy attached].

The Examiner is reminded that a "concise explanation of the relevance" of the submitted items "may be nothing more than identification of the particular figure or paragraph of the patent or publication which has some relation to the claimed invention," MPEP § 609.


While the information and references disclosed in this Information Disclosure Statement may be "material" pursuant to 37 CFR § 1.56, it is not intended to constitute an admission that any patent, publication or other information referred to therein is "prior art" for this invention unless specifically designated as such.

In accordance with 37 CFR § 1.97(g), the filing of this Information Disclosure Statement shall not be construed to mean that a search has been made or that no other material information as defined in 37 CFR § 1.56(a) exists. It is submitted that the Information Disclosure Statement is in compliance with 37 CFR § 1.98 and MPEP § 609 and the Examiner is respectfully requested to consider the listed references.

Respectfully submitted,

STALLMAN & POLLOCK LLP

Dated: March 10, 2004

By: 
Jason D. Lohr
Reg. No. 48,163

Attorneys for Applicant(s)

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| INFORMATION DISCLOSURE CITATION <i>(Use several sheets if necessary)</i> | Docket Number (Optional) TWI-6660 | Application Number NEW |
| | Applicant(s) Jon Opsal et al. | |
| | Filing Date HEREWITH | Group Art Unit Unknown |

U.S. PATENT DOCUMENTS

| *EXAMINER INITIAL | REF | DOCUMENT NUMBER | DATE | NAME | CLASS | SUBCLASS | FILING DATE |
|----------------------|-----|--------------------|------------|-------------------|-------|----------|-------------|
| | *A | 4,468,136 | 08/28/1984 | Murphy et al. | 374 | 45 | 02/12/1982 |
| | *B | 4,513,384 | 04/23/1985 | Rosencwaig | 364 | 563 | 06/18/1982 |
| | *C | 4,521,118 | 06/04/1985 | Rosencwaig | 374 | 5 | 07/26/1982 |
| | *D | 4,522,510 | 06/11/1985 | Rosencwaig et al. | 374 | 7 | 04/01/1983 |
| | *E | 4,579,463 | 04/01/1986 | Rosencwaig et al. | 374 | 57 | 05/21/1984 |
| | *F | 4,632,561 | 12/30/1986 | Rosencwaig et al. | 356 | 432 | 04/30/1985 |
| | *G | 4,634,290 | 01/06/1987 | Rosencwaig et al. | 374 | 5 | 11/14/1985 |
| | *H | 4,636,088 | 01/13/1987 | Rosencwaig et al. | 374 | 5 | 05/21/1984 |
| | *I | 4,652,757 | 03/24/1987 | Carver | 250 | 360.1 | 08/02/1985 |
| | *J | 4,710,030 | 12/01/1987 | Tauc et al. | 356 | 432 | 05/17/1985 |
| | *K | 4,750,822 | 06/14/1988 | Rosencwaig et al. | 356 | 445 | 03/28/1986 |
| | *L | 4,795,260 | 01/03/1989 | Schuur et al. | 356 | 400 | 05/15/1987 |
| | *M | 4,854,710 | 08/08/1989 | Opsal et al. | 356 | 432 | 07/23/1987 |
| | *N | 4,999,014 | 03/12/1991 | Gold et al. | 356 | 382 | 05/04/1989 |
| | *O | 5,042,951 | 08/27/1991 | Gold et al. | 356 | 369 | 09/19/1989 |
| | *P | 5,074,669 | 12/24/1991 | Opsal | 356 | 445 | 12/12/1989 |
| | *Q | 5,159,412 | 10/27/1992 | Willenborg et al. | 356 | 445 | 03/15/1991 |
| | *R | 5,181,080 | 01/19/1993 | Fanton et al. | 356 | 381 | 12/23/1991 |
| | *S | 5,228,776 | 07/20/1993 | Smith et al. | 374 | 5 | 05/06/1992 |
| | *T | 5,408,327 | 04/18/1995 | Geiler et al. | 356 | 432 | 07/14/1993 |
| | *U | 5,657,754 | 08/19/1997 | Rosencwaig | 128 | 633 | 07/10/1995 |
| | *V | 5,978,074 | 11/02/1999 | Opsal et al. | 356 | 364 | 07/03/1997 |
| | *W | 6,191,846 | 02/20/2001 | Opsal et al. | 356 | 364 | 11/01/1999 |
| | *X | 6,320,666 | 11/20/2001 | Opsal et al. | 356 | 601 | 10/16/2000 |

FOREIGN PATENT DOCUMENTS

| | REF | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUBCLASS | TRANSLATION | |
|--|-----|--------------------|------------|---------|-------|----------|-------------|----|
| | | | | | | | YES | NO |
| | *Y | WO 83/03303 | 09/29/1983 | PCT | G01N | 21/63 | | |
| | *Z | 0 432 963 A2 | 06/19/1991 | EPC | G01N | 21/17 | | |

OTHER DOCUMENTS

(Including Author, Title, Date, Pertinent Pages, Etc.)

| | | |
|--|-----|--|
| | *AA | A. Rosencwaig, "Depth Profiling of Integrated Circuits with Thermal Wave Electron Microscopy," <i>Electronic Letters</i> , 20th Nov. 1980, Vol. 16, No. 24, pp. 928-930. |
| | *AB | J. Opsal et al., "Thermal and plasma wave depth profiling in silicon," <i>Appl. Phys. Lett.</i> , 1 Sept. 1985, Vol. 47, No. 5, pp. 498-500. |
| | *AC | A. Rosencwaig, Chapters 17, 18, and 21 <i>Photoacoustics and Photoacoustic Spectroscopy</i> , 1980, pp. 207-244 (Chapts. 17-18) and 270-284 (Chapt. 21). |
| | *AD | X.D. Wu et al., "Photothermal microscope for high-T _c superconductors and charge density waves," <i>Rev. Sci. Instrum.</i> , Nov. 1993, Vol. 64, No. 11, pp. 3321-3327. |
| | *AE | J.T. Fanton et al., "High-sensitivity laser probe for photothermal measurements," <i>Appl. Phys. Lett.</i> , 13 July 1987, Vol. 51, No. 2, pp. 66-68. |

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|---|-----------------|
| Examiner | Date Considered |
| Examiner: Initial if citation considered, whether or not citation is in conformance with MPEP Section 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. | |

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| INFORMATION DISCLOSURE CITATION <i>(Use several sheets if necessary)</i> | Docket Number (Optional) TWI-6640 | Application Number NEW |
| | Applicant(s) Jon Opsal et al. | |
| | Filing Date HEREWITH | Group Art Unit Unknown |

U.S. PATENT DOCUMENTS

| *EXAMINER INITIAL | REF | DOCUMENT NUMBER | DATE | NAME | CLASS | SUBCLASS | FILING DATE |
|----------------------|-----|--------------------|------|------|-------|----------|-------------|
| | | | | | | | |

FOREIGN PATENT DOCUMENTS

| | REF | DOCUMENT NUMBER | DATE | COUNTRY | CLASS | SUBCLASS | TRANSLATION | |
|--|-----|--------------------|------|---------|-------|----------|-------------|----|
| | | | | | | | YES | NO |
| | | | | | | | | |

OTHER DOCUMENTS

(Including Author, Title, Date, Pertinent Pages, Etc.)

| | | |
|--|-----|--|
| | *AF | J.T. Fanton et al., "Low-Temperature Photothermal Measurements of High T _c Superconductors," <i>The Review of Progress in Quantitative Nondestructive Evaluation</i> (Reprint G.L. Report No. 4728 [Aug. 1990]), Presented July 15-20, 1990, 8 pages in length. |
| | *AG | B.C. Forget et al., "Electronic diffusivity measurement in silicon by photothermal microscopy," <i>Appl. Phys. Lett.</i> , 19 Aug. 1996, Vol. 69, No. 8, pp. 1107-1109. |
| | *AH | J.T. Fanton et al., "Multiparameter measurements of thin films using beam-profile reflectometry," <i>Journal of Applied Physics</i> , 1 June 1993, Vol. 73, No. 11, pp. 7035-7040. |
| | *AI | G. Langer et al., "Thermal conductivity of thin metallic films measured by photothermal profile analysis," <i>Rev. Sci. Instrum.</i> , Vol. 68 (3), March 1997, pp. 1510-1513. |
| | *AJ | G. Savignat et al., "Non-destructive characterization of refractories by mirage effect and photothermal microscopy," <i>Journal De Physique IV, Colloque C7, supplement au Journal de Physique III</i> , Vol. 3, Nov. 1993, pp. 1267-1272. |
| | *AK | M.B. Suddendorf et al., "Noncontacting measurement of opaque thin films using a dual beam thermal wave probe," <i>Appl. Phys. Lett.</i> , Vol. 62 (25), 21 June 1993, pp. 3256-3258. |
| | *AL | M. Liu et al., "Response of interferometer based probe systems to photodisplacement in layered media," <i>J. Appl. Phys.</i> , Vol. 76 (1), 1 July 1994, pp. 207-215. |
| | *AM | J.F. Bisson et al., "Influence of diffraction on low thermal diffusivity measurements with infrared photothermal microscopy," <i>J. Appl. Phys.</i> , Vol. 83 (2), 15 January 1998, pp. 1036-1042. |
| | *AN | E.P. Visser et al., "Measurement of thermal diffusion in thin films using a modulated laser technique: Application to chemical-vapor-deposited diamond films," <i>J. Appl. Phys.</i> , Vol. 71 (7), 1 April 1992, pp. 3238-3248. |
| | *AO | L. Pottier, "Micrometer scale visualization of thermal waves by photorefectance microscopy," <i>Appl. Phys. Lett.</i> , Vol. 64 (13), 28 March 1994, pp. 1618-1619. |
| | *AP | A.M. Mansanares et al., "Photothermal microscopy: Thermal contrast at grain interface in sintered metallic materials," <i>J. Appl. Phys.</i> , Vol. 75 (7), 1 April 1994, pp. 3344-3350. |
| | *AQ | A.M. Mansanares et al., "Temperature field determination of InGaAsP/InP lasers by photothermal microscopy: Evidence for weak nonradiative processes at the facets," <i>Appl. Phys. Lett.</i> , Vol. 64 (1), 3 January 1994, pp. 4-6. |
| | *AR | Jian-Chun Cheng et al., "Theoretical studies of pulsed photothermal phenomena in semiconductors," <i>J. Appl. Phys.</i> , Vol. 74, No. 9, 1 November 1993, pp. 5718-5725. |

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|--|------------------------|
| Examiner | Date Considered |
| Examiner: Initial if citation considered, whether or not citation is in conformance with MPEP Section 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. | |